

# (12) UK Patent Application (19) GB (11) 2 261 901 (13) A

(43) Date of A publication 02.06.1993

(21) Application No 9116828.6

(22) Date of filing 05.08.1991

(71) Applicant  
Michael John Radley Young  
Bremridge Farm, Ashburton, South Devon, TQ13 7JX,  
United Kingdom

(72) Inventor  
Michael John Radley Young

(74) Agent and/or Address for Service  
Michael John Radley Young  
Bremridge Farm, Ashburton, South Devon, TQ13 7JX,  
United Kingdom

(51) INT CL<sup>5</sup>  
E04F 21/165

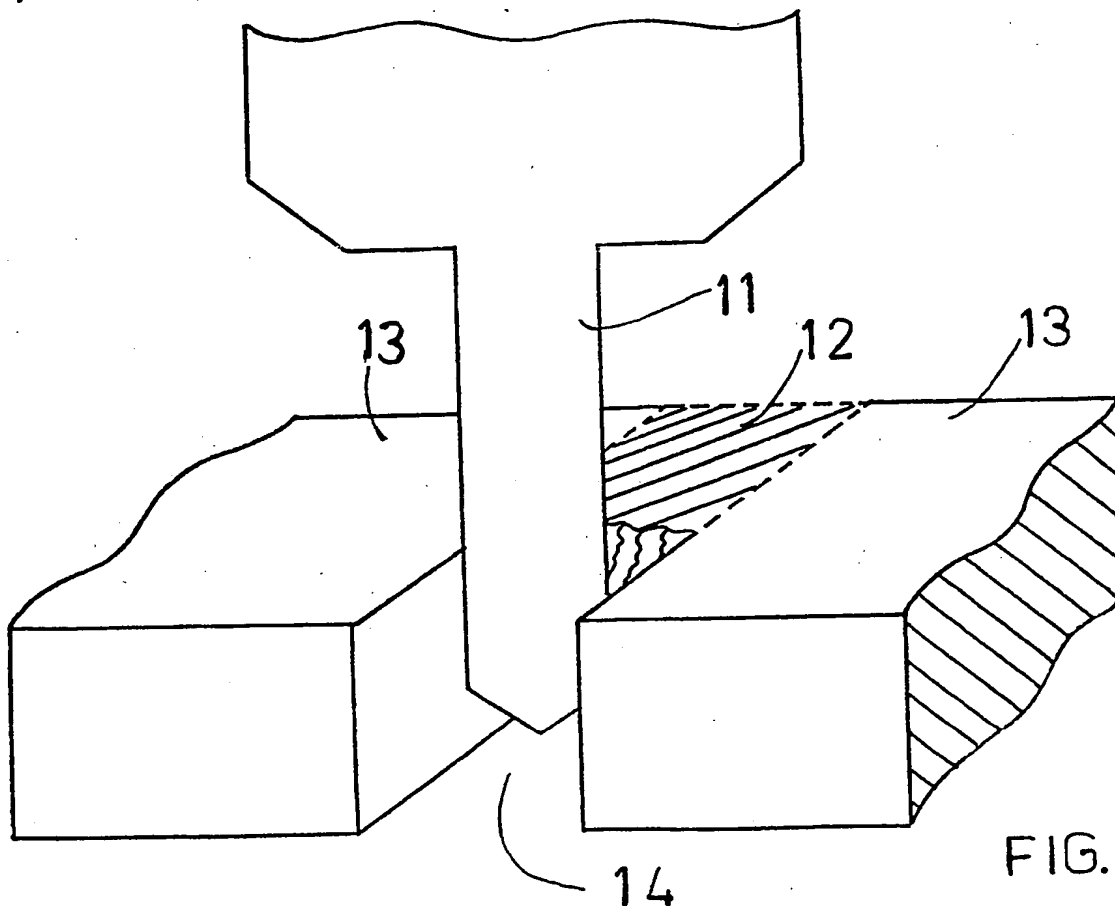
(52) UK CL (Edition L)  
E1S SAN  
B4B B64B

(56) Documents cited  
GB 2234006 A GB 2207380 A

(58) Field of search  
UK CL (Edition K) B4B, E1S SAN  
INT CL<sup>5</sup> E04F  
On-line database: WPI

(54) Method and apparatus for removing grout and mortar

(57) A method of removing grout or mortar filling from the joints between wall and floor cladding elements in which a narrow blade is vibrated at ultrasonic frequencies. The vibrating blade has a large transverse component of displacement which causes the filling material to break up and be dispelled from the joint. An apparatus for carrying out the method comprises a piezoceramic transducer to generate vibrations, a blade having a greater hardness than the filling material and a means to convey ultrasonic energy to the blade.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1990.

1/2

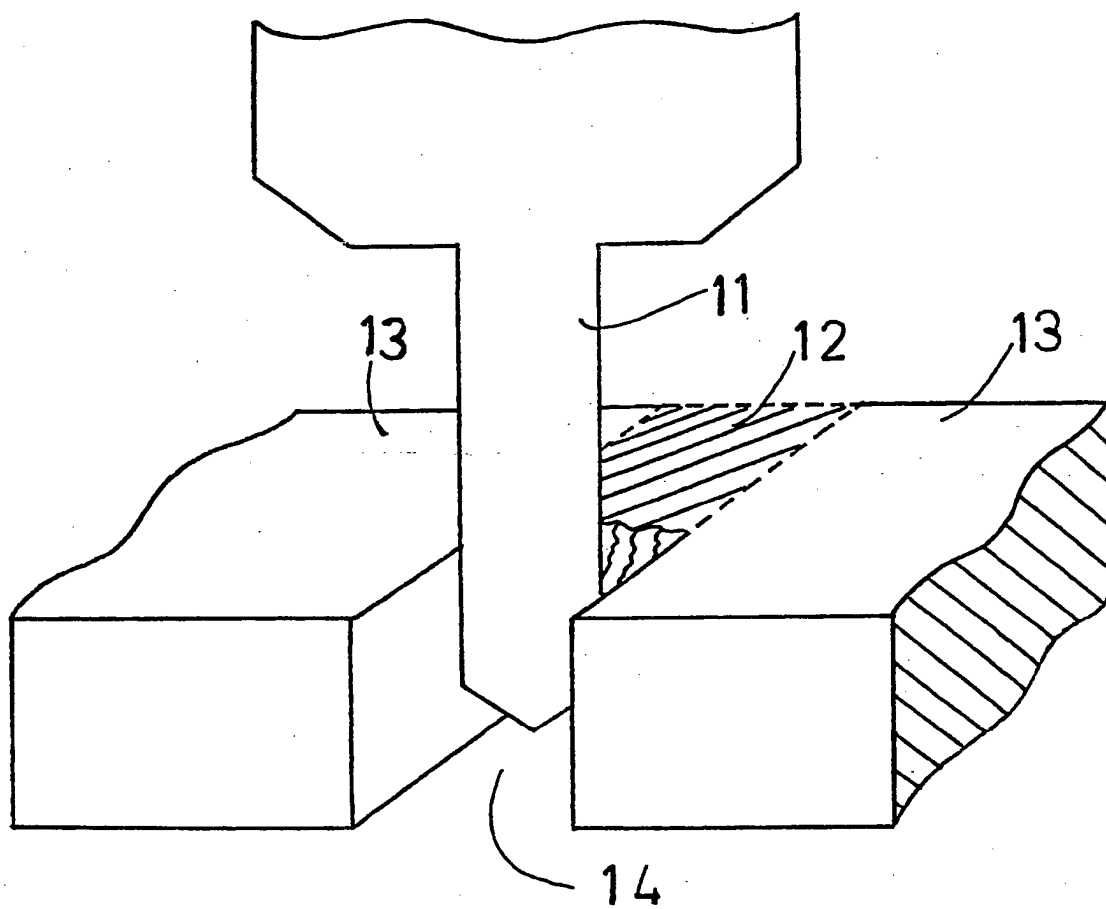


FIG. 1

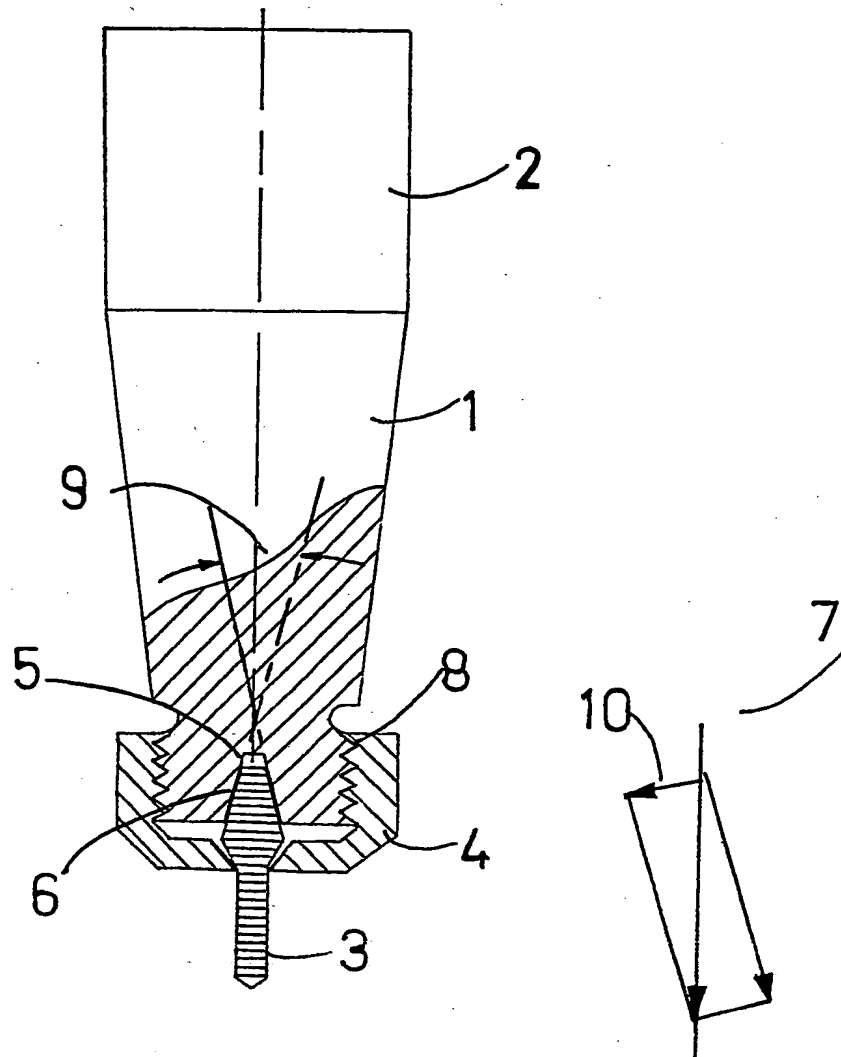


FIG. 2

Method and Apparatus for removing Grout and Mortar.

It is the normal practice in the building trade, when cladding a floor or wall with tile or brick products, to consolidate the resulting gaps between adjacent units of cladding material with a grout of mortar, plaster or epoxy resin compound. This may be applied with either brush or trowel, or it may be poured if the fluidity permits. 5

A wide range of materials are used for this purpose covering gypsum based products of the cement and plaster type, to epoxy based resins for more arduous applications. In all cases the compound is allowed to set and fulfils a dual function of sealing the surface against penetration by fluids and other contaminants and enhancing the mechanical strength of the fixing. Grout and mortar infills also fulfil an aesthetic function by virtue of their colour and in some cases, texture. The properties of such materials are dictated by these functions and they share a common requirement that they adhere firmly to all contacting surfaces of both cladding and substrate and that they are durable within their operating environment. This defines a minimum level of abrasion resistance and hardness. 10 15

These properties do, themselves, present a problem when it is required to replace one or more of the cladding units or merely, for aesthetic reasons, to replace the grout or mortar filling. 20

It is the object of the present invention to provide an improved method of removing these materials quickly and easily without damaging the surrounding cladding units.

According to one aspect of the present invention there is provided a method of applying ultrasonic vibrations via a specially designed hardened tip so as to break up the hard filler into particulate form; the product of this action being in the form of a plume of powder which is expelled from the joint a distance of a few centimetres. In the case of epoxy resin, the ultrasonic energy degenerates to heat which is preferentially absorbed by the resin causing it to soften sufficiently to be easily removed by simple manipulation of the ultrasonic tool. 25 30

According to another aspect of the present invention there is provided an apparatus for carrying out said method described above, which apparatus comprises a hard tip extension, a piezo electric ceramic transducer, tuned mechanical transformer and high frequency electrical power source. 35 An embodiment of the invention will now be described by way of example and with reference to the following figures:-

Figure 1. Shows the removal of grout between two cladding units.

Figure 2. Schematic illustration of ultrasonic system.

In Fig. 1 the vibrating tip 11 is inserted between cladding elements 12 in order to remove infill 12 thus revealing clear groove 14. 40

The action of the activated tip depends critically on generating a substantially transverse vibrational mode in the tip. This is achieved using the system shown schematically by way of example in fig.2. PZT transducer 2, energises tip 3 via mechanical transformer 1. Said tip, 45 made of hardened steel or tungsten carbide, is held firmly in place by cap 4 attached by threaded connection 8 to the output end of horn 1. said cap exerts pressure on tip 3, at conical shoulder 6, thereby pushing,

said tip into conical seating 5 in said horn. Included angle 9 at root of tip 3 is preferably between 60° and 90° to ensure an adequate transverse component 10, of the displacement amplitude defined in vector diagram 7. The large transverse amplitude in tip 3 ensures maximum dispersal of the grout infill so that the tip clears a groove twice its width when applied to plaster and cement grouts.

According to another aspect of the invention, when used with epoxy grout the high energy transfer from tip to filler rapidly causes break up by thermal degradation of the epoxy and mechanical displacement as the tip is impelled manually through the weakened infill material.

For convenience, the de-grouting head may be mounted in a pistol shaped handle with integral trigger switch.

### CLAIMS

1. A method of removing grout from between wall and floor facing units, the method comprising applying to the joint a thin blade, applying high frequency vibrations in a substantially transverse direction whilst moving the blade along the joint in order to break up and displace the filling material.
2. A method as claimed in claim 1 wherein the vibrations applied to the blade are of a frequency in the region 20-50kHz.
3. A method as claimed in claim 2 wherein the blade is encouraged to vibrate with a high transverse amplitude.
4. A method as claimed in the preceding claims wherein the high frequency vibrations applied to the blade are derived from ultrasonic vibration of a piezoceramic transducer.
5. An apparatus for removing grout said apparatus comprising a piezoceramic transducer to generate ultrasonic vibrations, a blade of material harder than the grout filling and means to convey ultrasonic vibrations to the blade.
6. An apparatus as described in claim 5 wherein the means to convey said vibrations to the blade is a tuned horn.

7. An apparatus as claimed in claim 6 wherein the blade has a frustum input end which contacts said horn in socket having a tapered surface of identical angle to that of said frustum.

8. An apparatus wherein apex angle of said frustum lies between 60 and 90 degrees.

9. An apparatus as claimed in claim 7 wherein said blade is pressed firmly into contact with said socket by a threaded cap which engages with said horn.



Patents Act 1977  
Examiner's report to the Comptroller under  
Section 17 (The Search Report)

-6-

Application number

GB 9116828.6

Relevant Technical fields

(i) UK Cl (Edition L ) E1S (SAN)  
B4B

(ii) Int Cl (Edition 5 ) E04F

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

Search Examiner

A H MITCHELL

Date of Search

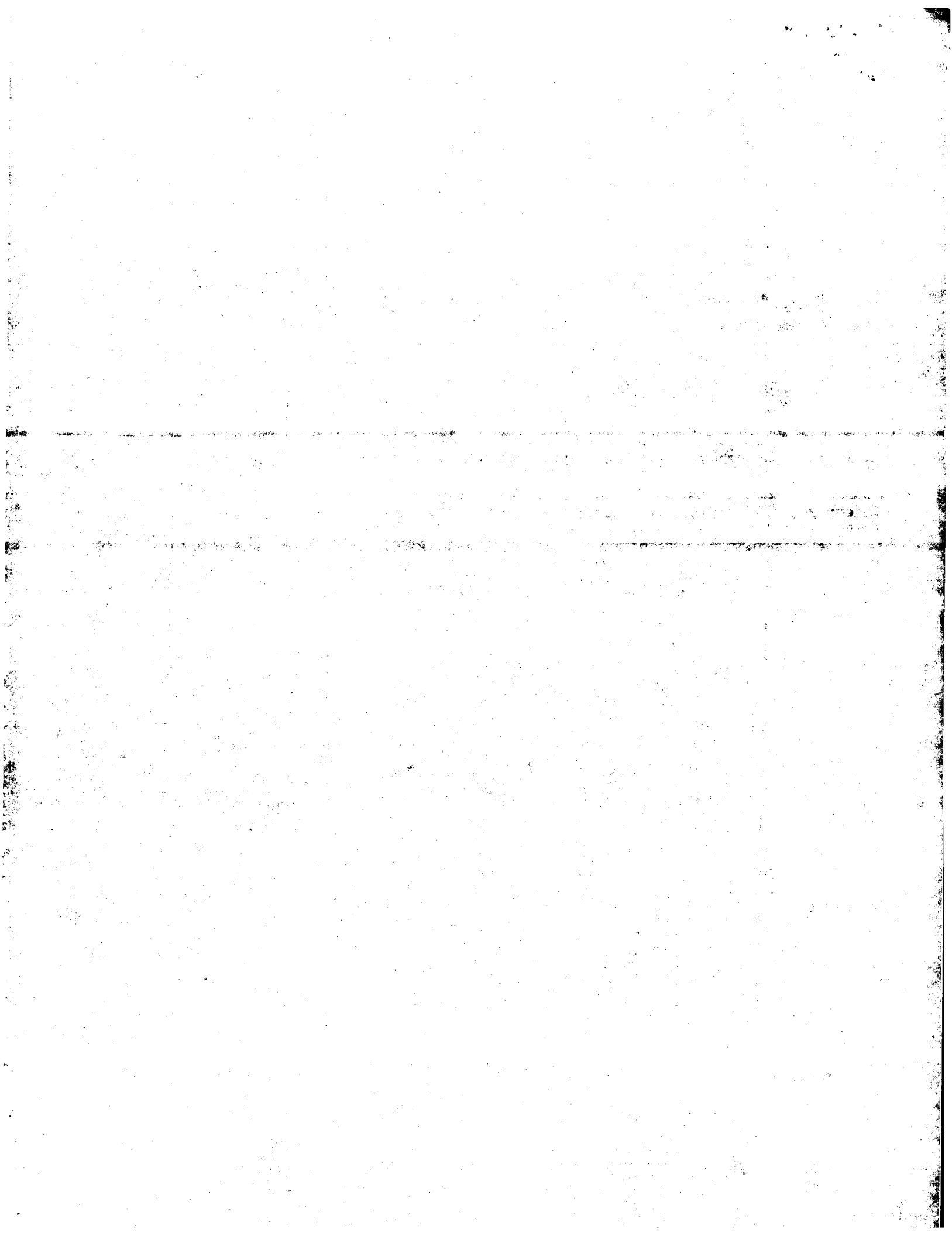
18 JANUARY 1993

Documents considered relevant following a search in respect of claims 1-9

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2234006 A (POWA PACK)	1
A	GB 2207380 A (STAUBIL)	1

SF2(p)

HCS - doc99\fil000823



Category	Identity of document and relevant passages	Relevant to claim(s)

### Categories of documents

**X:** Document indicating lack of novelty or of inventive step.

**Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.

**A:** Document indicating technological background and/or state of the art.

**P:** Document published on or after the declared priority date but before the filing date of the present application.

**E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.

**&:** Member of the same patent family, corresponding document.

**Databases:** The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

